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Mr. William F. Canton, Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

RE: **Comments of Andrew Sears, Philip Mutooni, and Boris Li on the petition filed by the America's Carriers Telecommunication Association (ACTA) requesting the ban of Internet telephony software.**

The attached comments on the subject docket, reflect our agreement and common understanding regarding the issue of banning Internet telephony. The comments are intended to provide the commission essential and supplemental information about this new and emerging technology. Therefore, these comments provide a more complete record for agency decision-making.

Accordingly, we urge the commission to accept the attached comments and supporting rationale that explain Internet telephony technology and the accompanying business and policy environments. The conclusions expressed herein are not those of the Massachusetts Institute of Technology, Tufts University, or Harvard University, rather those of Andrew Sears, Philip Mutooni, and Boris Li.

Please contact Andrew Sears at (617) 225-9738 if you require additional information concerning any aspects of these comments.

Very truly yours,

Philip K. Mutooni

Attachment

5

CCB

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
The Provision of Interstate and International Interexchange Telecommunications Service via the "Internet" by Non-Tariffed, Uncertified Entities	)	CC Docket No. 96-10 RM-8775

Comments of:

Andrew Sears, Philip K. Mutooni, Boris Li

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Respectfully submitted,

Andrew Sears, Philip K. Mutooni, Boris Li

Andrew Sears

These comments are submitted by three students in the Spring 1996 seminar on Information Technology, Business Strategy, and Public Policy jointly offered by the Harvard Business School and the Kennedy School of Government at Harvard University. Andrew Sears and Philip Mutooni are graduate students in the Technology and Policy Program, and the department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. Boris Li is a graduate student at the Fletcher School of Law and Diplomacy, Tufts University.

The seminar explores the evolving relationship between information technology industry developments and public policy, and the challenges of decision making in a volatile, rapidly changing environment. The seminar also provides a general understanding of the special economic conditions in different parts of the emerging information infrastructure, in particular providing insight into the strategic problems from business and policy perspectives. As a final paper for the seminar, the students chose to addresss the petition filed by the America's Carriers Telecommunication Association (ACTA) concerning Internet telephony. After studying the petition, the students decided that they were in a position to inform the FCC on the issue.

In it's filing, ACTA requests that the FCC ban the sale of Internet telephony products and regulate the Internet. In these comments we explain how Internet telephony is increasing competition in the long distance reseller market and explores the possible effects of regulating the Internet. We conclude by explaining how Internet telephony is a major step in the development of the NII, and recommend that the FCC should continue to pursue its policy to promote competition by keeping the Internet free from regulation.

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Executive Summary

In the past year, several software products have become available which allow for the transmission of voice over the Internet, which is called Internet telephony. In response to these products, on March 4, 1996, a lobbying group for non-dominant long distance carriers known as America's Carriers Telecommunication Association (ACTA) filed a petition before the Federal Communications Commission (FCC). The three requests of the ACTA petition are as follows:

- the FCC should "issue a declaratory ruling establishing its authority over interstate and international telecommunications services using the Internet,"
- the FCC should "grant special relief to maintain the status quo by immediately stoping the sale of this software," and
- the FCC should institute rulemaking proceedings defining permissible communications over the Internet.

The purpose of these comments is to fully examine the issues involved with this petition in order to make an informed recommendation for action. The first step in doing this will be to provide background on the Internet telephony market and the technology involved. The next step will be to examine the market of ACTA members and to consider how Internet telephony might be affecting it. After providing this background, the arguments in ACTA's petition will be examined to determine the effects and feasibility of their requests. We conclude by examining how Internet telephony fits into the development of the NII and how regulation might affect that development, and recommend that the FCC neither regulate the Internet nor Internet telephony.

Internet Telephony Market

The market development of Internet telephony software has been led by Voca Tec, which released its Internet Phone in March of 1995. Other companies soon followed by releasing similar applications, and now there are over 20 Internet telephony applications available, which are listed in Table 1.[1] The current business model for Internet telephony companies is similar to business models of other companies providing software for the Internet. Nearly all of these companies offer free demonstration versions of their software that can be downloaded from their World Wide Web sites.

PRODUCT	COMPANY
CoolTalk	Insoft/Netscape
Cyberphone	CyberScience
CU-Seeme	Cornell/White Pine
Digiphone	Third Planet Publishing
FreeTel	FreeTel Comm.
Intercom	Telescape
Internet Call	Hong Kong U.
Internet Phone	VocalTec
Maven	Charley Kline
Netphone	Electric Magic
NetTalk	Commerce OnLine
Nevot	Henning Schulzrinne
OnLive	OnLive Technologies
PGP Fone	MIT
Powwow	Tribal Voice
RAT	Independent
Softfone	Silversoft
Speak Freely	John Walker
Televox	Voxware
VAT	Independent
Webtalk	Quarterdeck
Webphone	Internet Telephone Co.

Table 1. Internet Telephony Applications

There are four basic business models in place now. In the first business model, free demo versions have some built-in limitation that encourages users to purchase the regular version. For example, Vocaltec's trial version allows users to make calls for only one minute before they must reload the software. To have full capabilities of the software, users must pay a one-time fee, usually around $50. In the second business model, which is used by Freetel, the software is free, and revenue is made from advertising to users of the software. The third business model is based on bundling Internet telephony software with other Internet software and revenue is made from the entire package. This is the strategy of Netscape, which is now bundling CoolTalk with its Web browser, and is also the strategy of Quarterdeck with its Webtalk software. Microsoft has also expressed interest in providing Internet telephony, and its strategy is likely to fall under this

model. In addition to these business models, there is also a fourth group that deserves mentioning because of the unique nature of the market which has very low barriers to entry. This fourth group consists of researchers and individuals who have designed their own applications and make them available for free on the Internet, with no attempts to make money. This is the case with products such as Speak Freely designed by John Walker, the former CEO of Autodesk.

There are currently very low barriers to entry into the market, and most market players seem to be focusing their strategy on maximizing network externalities by gaining a large user base. VocalTec is currently the market leader, and has claimed over 600,000 downloads of its software.[2] While these numbers are significant, they are small in comparison to the installed base of 25-30 million users that Netscape will have by packaging Cooltalk with its next release of its browser.[3] Microsoft's current Internet strategy suggests that it will also package an Internet telephony application with its Internet Explorer. With recent partnerships with America On-Line and Compuserve, Microsoft should have an installed base of several million with its Internet telephony software. Because of the high distribution methods of these two companies, it is likely that the competition among Internet telephony applications will become tied to the competition between Microsoft and Netscape over the Internet.

Internet Telephony Technology

The adjacent figure shows the common design that all of these applications share in that they allow one user with a computer connected to the Internet to talk voice with another user on a computer. While delays in transmission are

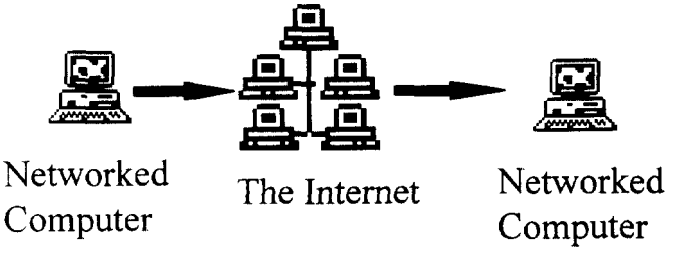

Figure 1. Current Internet Telephony Applications

noticeable if tested, the delays are not long enough as to make voice communications unbearable.[4] The main problem with these applications is that the sound quality is poor and very unreliable.[5] Another severe limitation of these applications is that calls can only be made from one computer to another. Because of this limitation, either users must prearrange calls or they must always leave their Internet telephony application running on their computer. In addition, it is clear from following user feedback that the main problem with existing user interfaces is not in the software design, but in the awkward multimedia equipment that requires the use of a microphone and speakers rather than using a headset.

All of these problems with existing applications has prompted announcements of a new generation of Internet telephony applications, which allow users to place calls through the public switched telephone network (PSTN). The figure below shows that the difference between these applications and the above applications is that there is a "gateway" which links the Internet with the PSTN, allowing the use of Internet telephony with a telephone on the PSTN network rather than a computer.

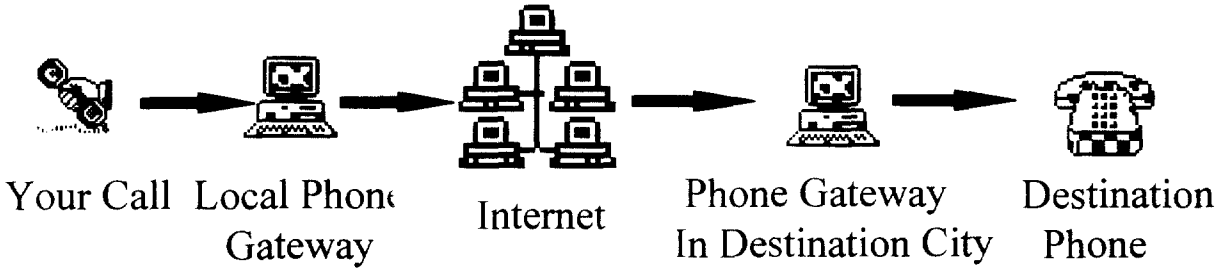

Figure 2. Diagram of Future Internet Telephony Applications

International Discount Telecommunications (IDT) has announced that it will provide a Net-to-phone service that will allow domestic and international Internet Phone users to place calls through the POTS network in major United States cities for only 10 cents per minute.[6] While

they have yet to deliver this service, a cost analysis of their service shows that they could offer calls at that price or less and still make a profit.[7] VocalTec recently announce a partnership with Dialogic, the lead manufacturer of computer telephony (CT) equipment, to develop gateways for Internet Phone users to place calls to the POTS network.

Background on the Market of ACTA Members

To understand how Internet telephony might be affecting the market of ACTA members, it is first necessary to understand their market. ACTA, Americas Carriers Telecommunication Association, is an industry association of small and medium-sized resellers of long distance phone services. Founded in 1985, its membership now totals more than 165 companies, including the fourth largest long distance carrier in the US, Worldcom, Inc.[8] The main purpose of ACTA is to provide national representation before legislative and regulatory bodies. The market for long distance telephony is dominated by AT&T, MCI, and Sprint with market shares of 65%, 14.2% and 9.7% respectively. The remaining 11.1 % is shared by ACTA members, who constitute small network operators and resellers.[9] Individual member companies operate at a regional, not national, level They are niche players reselling capacity through buying long distance circuits at bulk rate and reselling them to individual or corporate customers. They do invest in switching, transmission, and infrastructure equipment. In order to operate long distance phone service, they need to get approval from the FCC, and are subject to FCC rate regulation.

The market of ACTA members consists of many small companies primarily reselling long distance. Peter Huber argues that this market is distinct from the market for wholesale capacity, in the same way that retailers are different from wholesalers in other goods.[10] He argues that resellers cannot be in competition with wholesalers for the same reason that a bar

having a sale on Busch beer cannot be in competition with Anheuser Busch. Because AT&T, MCI and Sprint are essentially wholesalers of capacity, the resell of long distance through Internet telephony is not a form of competition in their market. This is why these companies do not share ACTA's concerns with Internet telephony.[11] It is important to note that some ACTA members, such as Worldcom do provide their own capacity and are actually in the wholesale market. Because ACTA is primarily composed of long distance resellers, this paper will focus on the effects of Internet telephony on that market.

Effect of Internet Telephony on the Long Distance Reseller Market

To understand the regulatory concerns related to Internet telephony, it is first necessary to understand its potential effects on existing markets. The first question to consider about Internet telephony is whether it only has value as an arbitrage mechanism or whether it provides value added to existing services. To understand how Internet telephony might be considered a mechanism for arbitrage, it is necessary to understand where the price savings comes from with Internet telephony. Internet telephony presents three mechanisms for price savings:

1. Savings from buying leased lines in bulk (simple arbitrage)
2. Savings from speech compression (value added)
3. Savings from the bandwidth efficiency of packet switching (value added)

The savings from buying leased lines in bulk is a mechanism for simple arbitrage similar to how the long distance reseller industry works. Long distance resellers operate through leasing high capacity lines at T-1 and T-3 rates which are considerably lower than if the lines were purchased separately.[12] This arbitrage opportunity exists because the market for high capacity lines is fairly competitive while the market for single lines is not.[13] The reason why the market

for high capacity lines is more competitive is that in that market, the buyers have more buyer power, and they can request competitive bidding for rates. The more capacity being leased, the more buyer power exists causing increased competition. If the capacity is bid for in an all-or-nothing method, this is known in microeconomics as Bertrand price competition, and the ideal result is that price should approach the marginal cost for the capacity, which is very low in this case.[14] Because the Internet uses mostly high-capacity lines they provide savings, so that it is not unreasonable to consider cost savings by more than a factor of 20.[15] It is important to note that as the capacity of the Internet grows, this savings will increase significantly because of the increased buyer power of those leasing lines for the Internet.

Internet telephony also provides savings through compression and the efficiency of packet switching, which can be considered added value. Most existing Internet telephony applications use compression routines that provide bandwidth savings of a factor of 5 to 50.[16] In addition, because the Internet is a shared network, additional efficiency can be gained.[17] This efficiency as well as efficiency from compression can be considered a form of value added in that it allows for the same service to be delivered (voice calling) while leaving more bandwidth available for other uses. In this case, the value added of Internet telephony is the value of other services that could be delivered with the additional bandwidth.[18]

To summarize, Internet telephony can produce line price savings of a factor of 10 to 1000. While some of this savings represents pure arbitrage, a majority of the savings could come from efficiencies that represent value added. It is important to note that the line costs of Internet telephony do not represent the full cost for delivering a call using Internet telephony, and in fact it only represents a small fraction of the total costs.[19] A large portion of the rest of the costs lie

in the cost of equipment to convert the voice signal for use on the Internet. This equipment might represent a personal computer, as is the case for existing applications, or a gateway which will allow for interconnection with the POTS network. Even considering these costs, IDT's Net-to-Phone service can be priced profitably at 10 cents per minute.

Understanding how Internet telephony produces a price savings to the consumer, it becomes more clear that Internet telephony is essentially the resell of long distance capacity. In fact, it probably does so in a much more efficient way than existing long distance resellers because of the savings from using packet switching and savings from the economies of scale of the Internet. Because of these efficiencies, if Internet telephony could produce reliable quality of service (QoS), it could become the dominant technology in long distance reselling, which is probably a concern of ACTA members. The overall effect that Internet telephony has on ACTA's market is that it decreases barriers to entry and increases competition. The two most significant barriers to entry in ACTA's market are related to size and regulatory constraints. Internet telephony reduces these barriers because it is not regulated and because it provides economies of scale by using the Internet as a common network.

Summary of ACTA Arguments

ACTA argues that existing Internet telephony software is carrying long distance voice transmissions at "virtually no charge." They argue that the providers of such software are telecommunications carriers and should be subject to FCC regulation like all telecommunications carriers. They argue that it is against "public interest to permit long distance service to be given away, depriving those who must maintain the telecommunications infrastructure of the revenue

to do so, and nor is it in the pu)lic interest for these select telecommunications carriers to operate outside the regulatory requiren ents applicable to all other carriers."

Their main justificatior for FCC authority to regulate the Internet is in the argument that Internet telephony could redu e the Internet's ability to handle customary traffic. They argue that this represents a finite re ource, and that the FCC should allocate this finite resource by defining permissible traffic o er the Internet. They argue that Internet telephony software providers are telecommunicati ns carriers and should be regulated as such. For this argument they use definitions of "telecommunications," "telecommunications carrier" and "telecommunications service" rom the Telecommunications Act of 1996.[20] As a part of their argument, they refer to the Sup eme Court case of *United States v. Southwestern Cable Co.*, 392 U.S. 157 (1968) which grante FCC regulatory authority over cable television. They also use this case to argue that the FCC would have power to issue a special relief to stop all activity in this area to maintain the status uo. Finally they argue that it is the FCC's obligation to preserve fair competition. They argue hat a fair price is required for telecommunications services in order to promote universal se vice. In addition, they argue that without action from the commission, the technology ould lead to "unlawful uses, such as gambling, obscenity, prostitution, drug trafficking, an 1 other illegal acts."

In ACTA's petition, the argue that the Internet telephony software companies should be regulated as telecommunication carriers. In addition, they argue for rulemaking to govern "the use of the Internet for providing telecommunications services," which could have several effects. The first effects to consider is th e local access subsidy would might to be paid to local telephone companies for the use of Intern t telephony, either by the software providers or Internet access

providers. The second general effect would be to require regulatory overhead that might include filing, additional fees and international tariffing issues. Rather than performing a point by point legal rebuttle of ACTA's arguments, this paper will focus on the key business and policy issues that it presents.

Banning the Sale of Internet Telephony Software

The first issue to consider is ACTA's request to ban the sale of Internet telephony software. The first concern with their argument is with the classification of a software provider as a telecommunications carrier. The problem with this definition is that the software providers do not provide the medium for transmission because the medium of transportation is the Internet which is provided by the Internet Access Provider (IAP). The fitting definition for Internet telephony software providers is an Access Software Provider.[21] The relation of this function to the Internet is equivalent to the relation of telecommunications equipment to the PSTN. Internet telephony software only provides the means to make connections and convert digital signals for use on the Internet, which is analogous to equipment in the existing telephone network. Because of this, classifying Internet telephony software providers as telecommunications carriers is equivalent to classifying equipment providers as telecommunications carriers.

This brings up a major concern that this ban would establish a precedence giving the FCC authority to regulate the software industry. This creates many problems considering the modern integration of computing and telecommunications. For example, Microsoft's current Internet strategy is to integrate the Internet will all existing applications. It is likely that Internet telephony applications will be integrated into existing applications. For example, a word processor could have a "help" button that provided a real-time voice connection through the

Internet with customer service. As these type of applications become more common, regulating Internet telephony could involve the FCC in regulating most of the software industry.

As will be explained later in the paper, Internet telephony could play a key role in providing interoperability in the National Information Infrastructure. If Internet telephony can provide reliable service, it may become the key technology in future telecommunications markets. If the FCC bans this technology, it will simply be developed in other countries, causing the US to be handicapped in this market. Because the Internet telephony market is becoming linked with the market for other Internet tools such as Web browsers, this could also have effects on US competitiveness in the market for Internet software.[22]

Requiring Local Access Fees for the Internet

To understand the possible effects of regulating the Internet, it is necessary to understand the background on the local access subsidy. The local access subsidy is a fee paid by the IXC's to the LEC's to connect to their local network, and is currently 2.5 cents per minute for each end of the call.[23] It was originally established for two reasons: to compensate the LEC's for the cost of using their network, and to promote universal service by subsidizing local access with long distance. It is commonly agreed that the actual costs for the LEC's to complete a call is considerably less than this charge, so that the remainder of the charge is seen as a subsidy for local access.[24] As of 199[illegible], this local access subsidy amounted to over 20 billion dollars, constituting about 40% of IXC's costs.[25] Traditionally enhanced services, such as Internet access, and services that are created by advances in the customer premises equipment are not subject to this charge.[26] The question that is being considered is whether Internet access should still be exempt from the local subsidy by being classified as an enhanced service.

Because ACTA's petition requests that Internet telephony software providers be regulated as telecommunications carriers one of the results would be to require the software providers to pay the local access subsidy. The first problem with doing this is that because Internet telephony is software, it represents an advance on the customer premises equipment, which would make it exempt from paying the local subsidy. The second problem involves the complications and precedent that would be set by requiring a software company to pay a local subsidy fee. This brings up questions of who should pay the subsidy in the future, when a range of applications all use Internet telephony.

The next consideration is whether Internet access providers should be required to pay the local subsidy. There are two options for charging IAP's the local subsidy: the IAP pay the access fee only when Internet telephony is used or the IAP pay the access fee for all Internet access. The problem with requiring the IAP to only pay the access fee for Internet telephony is that it is very difficult and costly for the IAP to distinguish voice from data. A user connects to an IAP and only sends a stream of bits which leave little indication whether they are voice or data.[27] Although costly mechanisms could be established to attempt to block or distinguish Internet telephony service, there are simple ways to disguise the information to make it very hard to detect, so even if it could be done, it would be very costly.[28] Even if such a system could be implemented, it would require monitoring programs to examine and censor every packet being transmitted to the Internet, which would be a monitoring mechanism unparalleled in history and could bring up significant privacy issues.

Considering these problems with requiring the subsidy only for Internet telephony, the next alternative would be to require IAP's to pay the local access charge for all Internet traffic.

This brings up another concern over whether the FCC would even have jurisdiction over the IAP's. The setup for most existing IAP's is to have a "modem bank" in the local calling area of users that they can call. Most of the existing IAP's connect locally to the Internet through an upstream Internet Service Provider, so the actual transmission for many IAP's never crosses state lines, and should fall under state regulation not FCC regulation. This is not true for all IAP's since AT&T is operating as an IAP providing Internet access, except that they use long distance lines to connect the local user to their "modem bank," which could make them subject to FCC regulation.

Effect of Internet Local Access Charge: Universal Service or Competitive Advantage

One way to look at the local access charge would be to consider how it might serve as a strategic move to gain competitive advantage. A fee of 2.5 cents per minute charged to IAP's for each customer would have a considerable effect on the price seen by the end user. Considering that a common price for Internet access is now $1 per hour, this would represent an increase of 150% to $2.50 per hour, which would be a considerable disadvantage to IAP's. Because AT&T, MCI and Sprint are also Internet providers, they would suffer the same disadvantage.

The strategic implication that this would have for the LEC's is that they could use their own network to deliver Internet service without paying the access charge, which would give them a considerable competitive advantage in the Internet access market. Competitors would have an additional cost of $.50 per hour, which would probably put most all IAP's out of business, considering that the LEC's could still offer access at the existing rate of $1 per hour. The end result would be that the LEC's would be given a virtual monopoly for Internet access through local phone lines. The response to this would be that alternative routes for the local loop

such as cable or cellular would be used to deliver Internet access. While this might benefit cable and cellular providers, it would have the effect of severely reducing overall competition.

The main effect that the local access charge would have on ACTA's market would be to increase barriers to entry and decrease competition. Currently, a software company or IAP can enter ACTA's market with relatively low barriers to entry. If they were required to pay local charges, these barriers to entry would increase significantly.

In considering whether charging a local access charge for Internet access might be a strategic move is to consider the effects that it would have on advancing universal service. While it is hard to estimate precisely the size of the IAP market, a good estimate was between $700-800 million per year as of March 1996.[29] While it is hard to assume what the actual access charge might be, one assumption that could be used is the charge would take 40% of these revenues as it does in the IXC market, which would be roughly $300 million in revenues to promote universal service. While this assumption is crude because it does not consider the decrease in use of Internet access from the charge and it does not take into accounts the differences between IAP's and IXC's, it does give a general range of revenue from the charge. This $300 million is small in comparison to the $20 billion paid by LD carriers, and is not likely to have much of an impact on advancing universal service. In fact, if the definition of universal service is expanded to include other services, the increase price for Internet access could actually cause universal service to decline. From this analysis, it can be concluded that the primary effect of implementing the local charge would be to provide a competitive advantage rather than to promote universal service.

Another consideration with requiring a local subsidy on Internet access is that the current structure of the local subsidy is now being question as to whether it is the best means to achieve universal service. At a recent talk at Harvard in the Fall of 1995, Reed Hundt the local subsidy is much larger than it should be [30] The Access Reform Task Force in 1993 has also brought up numerous concerns with the local subsidy. Jerry Hausman, a leading telecommunications analyst, has argued that the cross-subsidization of local service from long distance is an economically inefficient way to achieve universal service, and has estimated that this inefficiency has cost the US economy over $1.1 billion per year. In his analysis he presents a plan to achieve the goals of universal service while eliminating economic inefficiency.[31] Internet telephony presents a whole new range of problems with the local subsidy, making past mechanisms for cross-subsidization seem even more in need of revision.

In addition to the local subsidy charge, other regulations could also serve to increase barriers to entry to existing markets. Currently, anyone can become an IAP simply by setting up their equipment and advertising their service. Software providers only need to write their software and make it available on the Internet to get global distribution. If ACTA's requests were implemented, then these players would have to face possible regulatory hurdles such as filing with the FCC, paying additional fees and International tariffing among others. While this may seem favorable to ACTA because it increases barriers to entry to their market and decreases competition, it could have a chilling effect on the innovation currently seen in the software industry and the Internet.

Internet Telephony Extending the Internet to the Vision of the NII

If Internet telephony is not the theft of fees as ACTA suggests, the question then becomes what is the real significance of Internet telephony. To understand this, it is necessary to

understand that the most significant added value of Internet telephony comes from the fact that it provides interoperability between voice service on the Internet and the PSTN network. The vision outlined for the National Information Infrastructure (NII) is a network which provides interoperability with all networks, and that the Internet is a prototype for this future network.[32] The main significance of Internet telephony is not in that it provides voice communications over the Internet, but in that it provides the means by which to make the Internet interoperable with the POTS network. The diagrams below show how Internet telephony extends the interoperability of the Internet to include the POTS network.

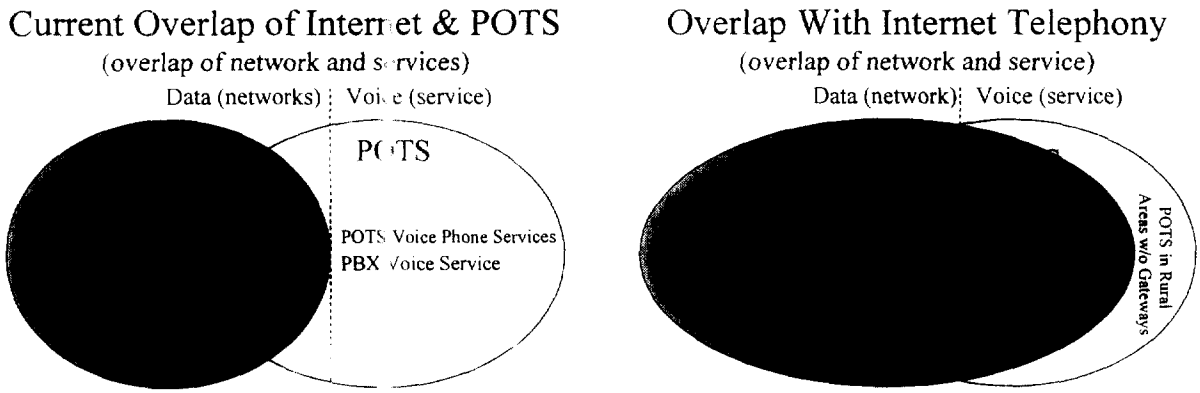

Figure 3. Extending the Internet to the NII

This interoperability could allow for users of networked computers to make calls to through the POTS network, and POTS users could make calls directly to computers. Some of the applications that this interoperability would bring might include a global voice mail system similar to the E-mail system, integrated voice mail and E-mail, speech recognition, World Wide Web pages with "800" links allowing for two-way audio and many other applications. Considering the possibility of these types of services with Internet telephony, it becomes clear

that not only is there value added, but Internet telephony represents a significant step toward realizing the NII.

The Internet provides new entrants with the advantages of economies of scale since it is a large network, while allowing anyone to interconnect and deliver services to all other users. In fact, barriers to entry are so low that all existing Internet users need to do to set up their own long distance service to the rest of the world is to buy a $60 modem and get free software being made available by a group known as Free World Dialup.[33]

Effects of Regulating the Internet Telephony on the NII

One question to consider is if Internet telephony represents the natural evolution of the Internet into the NII, then what would be the effects of restricting Internet telephony. Internet telephony has created an increased demand for real-time transmission over the Internet. Because of this in the past year, major advances have been made in real time protocols for the Internet. The final draft of the RSVP protocol, which can provide reliable service over packet networks, has just been completed and routers are currently under development.[34] This represents a major technological breakthrough in networking, which will enable the Internet to evolve to realize the goals of the NII.

To restrict Internet telephony at this point would remove the incentives to develop this technology which could halt its development and the deployment of the key technologies for the NII. The result would be that foreign competitors would be able to develop the technology, while development in the US would be restricted from regulation. The technologies used in Internet telephony are likely to form the basis of future development of the NII.[35] Because of the importance of the NII, restrictions of this new technology could have a significant effect on US

competitiveness. Right now, the current regulatory uncertainty with Internet telephony is undoubtedly scaring of would-be investors. For this reason, in order to foster development in this area, the FCC needs to provide some guarantee that it will not significantly change its existing policies in this area to provide stability for investment.

The goal of the NII is a network with full interoperability. This means that at some point voice services on the Internet will have to become interoperable with voice service on the POTS network. Existing Internet telephony applications represent a significant step in this direction, and future applications such as gateways could provide full interoperability between voice services on the two networks It is impossible to have interoperability between voice services between the Internet and the POTS network if voice services on the Internet are restricted by regulation. Because of this, restricting Internet telephony would be the equivalent to restricting interoperability in the NII.

There are significant advantages to providing interoperability of voice services between the two networks. Katz, Rosston and Anspacher of the FCC list several benefits of interoperability in their recent article "Interconnecting Interoperable Systems: The Regulator' Perspective," which are as follows:[36]

1. Greater realization of economies of scale and scope
2. Greater realization of network effects
3. Increased competition

These are precisely the effects that Internet telephony is having on existing markets, which is probably the reason existing carriers are concerned. Because of the significance of providing interoperability in the NII, and realizing that banning Internet telephony would make

interoperability impossible, it becomes clear that banning Internet telephony is not a reasonable option.

If banning Internet telephony is not reasonable, the next question is whether regulation is needed to provide interoperability between the two network. Here we see that the market is doing a fairly good job of providing incentives in this area. While some might argue that there is little interoperability between existing Internet telephony applications (which is currently true). However, patterns in the innovation cycle show that this is expected in any new market—in fact it is a sign that the market is functioning correctly.[37] The next stage in the innovation cycle is the emergence of dominant players, which is already shown by the entrance of Netscape and Microsoft into the market. The next question is whether the market will provide incentives to develop interoperability between voice applications on the Internet and voice on the POTS network. Here also we see rapid development and the emergence of major market players, such as Dialogic, to fulfill this need. If the market is providing this incentive for interoperability, then there is little need for regulation to provide interoperability.

Conclusions

Internet telephony highlights the regulatory problems with the Internet evolving into the NII. Traditionally, the PSTN has been regulated with a framework focused on economies of scale and clear boundaries between services. Modern studies have shown that the future of the NII will rely less on economies of scale and more on rapid innovation.[38] Part of the reason for this is that the Internet provides economies of scale of having one network while at the same time promoting innovation. The FCC's move toward increased competition has been a major step in this direction, but a regulatory framework that has existed for decades is not so easily undone.

The Internet represents a powerful force to provide competition in markets where it previously never existed. Because of this it is likely that future regulatory debates will be dominated by existing carriers trying to regulate the Internet to protect themselves from the new competition that it introduces.

To understand the basis of ACTA's petition, it is important to understand the effects that Internet telephony decreases barriers to entry into their market, which will increase competition and lower their profit margins. Internet telephony does not have an effect on the dominant IXC's because they are in a different market than ACTA members. The regulation of Internet telephony would increase barriers to entry into ACTA's market by adding regulatory overhead costs to new entrants. This might be a significant deterrent because many of these new entrants are small software companies and small Internet access providers which could not afford the regulatory overhead. In addition, it would increase barriers to entry into the IAP market and give the LEC's a considerable competitive advantage. One possible solution would be to lift regulatory burdens on ACTA members, but this also would decrease barriers to entry and increase competition in their market which they would not likely favor.

Regulating Internet telephony could have a significant effect on the development of the Internet. There is no easy way to ban Internet telephony without adding significant costs to the network. Banning Internet telephony could severely jeopardize the development of interoperability in the NII and jeopardize the competitiveness of the US in the global market. To even regulate Internet telephony at all, there should be some pressing reason. Raising barriers to entry so ACTA members can enjoy higher profit margins does not seem to be a very pressing

reason. At this point, it appears that the only effect that not regulating Internet telephony would be to increase competition.

Therefore, it is recommended that the FCC not regulate the Internet or Internet telephony. Because of the importance of the Internet and the software industry to the development of the NII, it is essential to provide a consistent regulatory policy toward the Internet and the software industry. To date the FCC's policy toward the Internet and the software industry has been to promote competition by not regulating it, and which appears to have worked remarkably well. In order to provide a stable regulatory environment to promote investment, it will not be enough for the FCC simply to issue a statement of policy to not regulate the Internet. The FCC will need to make a long term commitment in this area to promote investment. For the same reasons it is recommended that the FCC does not issue a Request for Rulemaking on this issue because it could create significant uncertainty around rapidly developing technologies that could impede their development. The FCC has done well in promoting competition by not regulating the Internet to date, and this pro-competitive stance should be upheld in this case.

Respectfully submitted,

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